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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR FEBRUARY 1937

Vol. IV, No. 4 (Not for publication) April 1, 1937

PROCUREMENT OF SUPPLIES FOR THE FIELD SERVICE

The special attention of field representatives of the Bureau is invited to Administrative Memorandum EQ-144 on procurement of supplies for the field service. This subject is important to practically all field men, and a number of points regarding it are rather generally misunderstood. The memorandum referred to makes clear the reasons for certain procedure, which has not been fully understood, and should result in expediting business of this kind.

A. J. ACKERMAN

With the death of A. J. Ackerman on February 27, 1937, the Division of Fruit Insect Investigations lost one of its oldest field workers, from the standpoint of length of service. Mr. Ackerman was born at Worcester, Mass., on October 5, 1889. He graduated from the Massachusetts Agricultural College in 1912 and received his M. S. degree from the same institution in 1914. On July 1, 1914, he entered the Division of Deciduous Fruit Insects, and served at West Chester, Pa., from 1914 to 1916; at Benton Harbor, Mich., in 1917; at Bentonville, Ark., from 1918 to 1933; and at Vincennes, Ind., until his death. The work at Bentonville was interrupted in 1921, when Mr. Ackerman was assigned for a season to work on codling moth control and spray residue on pears in California. Mr. Ackerman is best known for his work with lubricating-oil emulsions for the control of the San Jose scale. This work was carried on in Arkansas for several years beginning late in 1921. He also made extensive biological studies of a number of species of leaf hoppers on apple and grape. During recent years he gave practically all his attention to codling moth control.

FRUIT INSECT INVESTIGATIONS

Dichlorethyl ether kills larvae of dried-fruit beetle in soil.--D. F. Barnes and C. K. Fisher, of the Fresno, Calif., laboratory obtained kills of larvae of *Carpophilus hemipterus* L. in excess of 90 percent by means of water solutions of dichlorethyl ether applied to soil at rates of 10 and 20 cc per square yard. No consistent differences in lethal effect occurred when these quantities were applied in 1 gallon and in 2 gallons of water per square yard. A dosage rate of 10 cc killed 93 percent of dried-fruit beetle larvae, whereas 20 cc per square yard killed 98.7 percent. The tests were made under small-scale experimental conditions, and require confirmation by field trials.

Improved raisin cleaner removes 90 percent of raisin moth infestation.--H. C. Donohoe, of the Fresno laboratory, reports that a portable shaker-screen driven by a 1/2-horsepower motor, at a speed of about 360 r.p.m. when loaded, was used to remove infestation of *Ephestia figulilella* Greg., from 253 tons of Thompson Seedless raisins during the harvest of 1936. The machine is an improved type, similar to that built in 1935. Samples from 8 lots showed that about 90 percent of the raisin moth infestation was removed. In addition to reducing infestation and feeding damage, the machine removes dirt. By proper use of the cleaner, supplemented by shade-cloth protection of cleaned fruit, delivery by growers of comparatively clean raisins is now in prospect for the first time.

Dichlorethyl ether effective against peach borer.--O. I. Snapp and J. R. Thomson, of the Fort Valley, Ga., laboratory, report excellent results from the use of dichlorethyl ether applied during the winter for the control of *Conopia exitiosa* Say in nursery stock before and after it is dug. The material was dissolved in water at the rate of 30 cc per gallon of water and then applied as a spray. Both the ¼-pint and ½-pint dose per tree gave 100-percent control of the borer in nursery stock in the nursery row, with no tree injury. When applied to bundles of dug nursery stock heeled in an upright position, at the rate of 60 ounces for each bundle of 15 trees, the material gave 100-percent control of the borers, with no tree injury. Winter applications of dichlorethyl ether are now being made at Fort Valley to determine the effect of this water-soluble material on the peach borer in orchard trees of different ages.

Viability and infectiousness of Type A milky disease organisms found in meconium material.--In earlier experiments carried out by R. T. White, of the Moorestown, N. J., laboratory, it was found that *Tiphia* parasites of the Japanese beetle would oviposit and complete development on certain diseased host larvae. Further experiments have shown that a *Tiphia* larva which had successfully developed upon a diseased host was able to rid itself of all traces of the causal agent at the time its meconium was voided. It was found that the vegetative form of the organism was seemingly digested within the parasite's digestive tract. The question then arose as to the viability of the spores in the meconium, as well as the infectiousness of this material when it came into contact with healthy grubs. Experiments have been conducted to determine whether this meconium material could cause infection when injected directly into the blood stream of a healthy grub or whether it must be ingested by the grub and thus enter the alimentary tract. Summarizing the data from all these experiments, Mr. White states that no disease was produced when 50 grubs were inoculated by puncture with the disease material and allowed to cease bleeding before being stored in autoclaved soil. One grub out of 10 became diseased when allowed to bleed in the soil in which they were stored. Infection in this instance probably resulted from ingestion of the causal agent, rather than from the injection into the blood stream. On the other hand, 25 out of 56 grubs (44.6 percent) placed in soil contaminated with an aqueous solution of meconium material became diseased, indicating that the spores must enter the alimentary tract to cause infection. No disease was evident in any of the 65 grubs held as a check in autoclaved soil.

Effect of ferric oxide on acid lead arsenate as a stomach poison and repellent against Japanese beetle.--During the summer of 1936 several cases of arsenical injury were observed on the foliage of oak, linden, elm, and maple trees that had been sprayed with acid lead arsenate as a repellent against the Japanese beetle. As it had been reported that ferric oxide acted as a corrective for arsenical injury when used with acid lead arsenate, W. E. Fleming and F. E. Baker, of the Moorestown laboratory, make some tests with ferric oxide added to acid lead arsenate spray, in order to determine the effect of the ferric oxide on the toxicity and repellency of the acid lead arsenate to Japanese beetles. Smartweed was used as the test plant and was sprayed with 8 pounds of acid lead arsenate, alone and in combination with 8 and 16 pounds of ferric oxide per 100 gallons of water. The tests, using 200 beetles in each, were run under controlled conditions in the usual manner for making tests with the Japanese beetle. The results are given in the following table.

Ferric oxide used	Average beetles poisoned	Relative poisoning	Foliage eaten	Relative feeding
	Number	Percent	Square inches	Percent
None------------ --	80.7 ± 9.26	100 ± 16	2.3 ± 0.26	100 ± 16
Eight pounds------	40.1 ± 5.53	50 ± 9	3.5 ± .45	152 ± 26
Sixteen pounds---	50.8 ± 4.93	63 ± 9	6.3 ± .77	274 ± 45

The data show a significant reduction in mortality and an increase in the amount of feeding which seems to approach significance, following the inclusion of ferric oxide with acid lead arsenate in the spray on smartweed. The results indicate that the use of ferric oxide with lead arsenate for the purpose of reducing arsenical injury to shade trees would be unsatisfactory because it reduces the insecticidal and repellent value of the lead arsenate.

Relationship of environment to colony survival of Japanese beetle parasite.--In connection with studies of the recovery of colonies of *Tiphia popilliavora* Roh. (Koiwai strain), M. H. Brunson, Moorestown, has studied the environment of the recovered colonies. As most of the colonies were placed in three soil series--Chester, sassafras, and Collington--only these series are considered. The relationship between colonies recovered and soil series is shown in the following table.

Soil series	Colonies liberated	Colonies recovered	
	Number	Number	Percent
Chester-------	44	37	84.1
Sassafras-----	55	36	65.5
Collington----	18	5	27.8

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The relationship between type of colony location and percentage of colonies recovered is shown in the following table.

Location	Colonies liberated	Colonies recovered	
	Number	Number	Percent
Golf courses	12	12	100.0
Fields (not cultivated)	48	34	78.8
Lawns	13	8	61.5
Pastures	35	19	54.3
Orchards	13	5	38.5

The order of the above locations in percentage of recovery is, with one exception, the order of host-grub population per square foot in the different locations mentioned. The exception is that fields (not cultivated) would probably follow pastures in the average number of host grubs per square foot. The reason for fields appearing second in the table probably lies in the fact that wild carrot, the food plant of T. popilliavora, is more abundant in the uncultivated fields than in any of the other locations mentioned. The abundance of the food plant might prove to be a more important factor than it has been considered in the past. These data show definitely that the highest percentage of recoveries might be expected at colony points located in Chester soil series and the lowest percentage of recoveries at colony points located in Collington soil series. The data also indicate that orchards are poor locations for colonization and that golf courses, fields not cultivated, lawns, and pastures are preferable for colonization, in the order given.

MEXICAN FRUIT FLY CONTROL

Trapping in the lower Rio Grande Valley.--During the month of February traps set in the groves and brushlands of the lower Rio Grande Valley took 1,436 adult Anastrepha ludens Loew from 249 locations. The total number of flies trapped to date, namely 2,008, is far greater than during any previous year. Infested fruit was found on 13 premises in 5 districts during the last 10 days of the month. All of these infestations were extremely light and the properties were cleaned of fruit without difficulty. Approximately 4,250 cars of citrus fruits were moved by rail, truck, and steamer from this area during the month. The number of fruit flies of various species identified in February were as follows:

Species	Texas	Mexico
Adults trapped	Number	Number
Anastrepha ludens Loew	1,436	4
Premises	249	3
A. serpentina Wied.	7	0
Premises	7	0
A. acidusa Walk.	36	0
Premises	34	0
A. sp. "X"	8	0
Premises	7	0
A. sp. "Y"	121	1
Premises	93	1
A. sp. "Z"	1	0
Premises	1	0
A. sp. Seg. 3	4	0
Premises	4	0
A. pallens Coq.	494	1
Premises	136	0
Toxotrypana curvicauda Gerst.	42	0
Premises	39	0
Total	2,149	6
Larvae collected		
A. ludens	301	*306
Premises	13	
A. serpentina	0	*196
Premises	0	
Rhagoletis sp.	0	*3
Premises	0	
Total	301	505

*All from market fruit.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Alfalfa weevils survive long period in bales.--Ralph W. Bunn, of the Salt Lake City laboratory, reports that, in experiments to determine the occurrence of weevils in commercially baled hay, examinations have been made of a number of bales through the use of a shaker which reduces the quantity of hay to small volume and subsequent exposure of the residue to heat in large Berlese funnels. These results indicate that weevils occur in the Salt Lake Valley in hay baled from all four crops and that the number varies inversely with the length of time in the bale. Weevils have been found in bales with a maximum storage period of 189 days; however, of those having been baled 100 days or over, 52 percent have been entirely free from weevils, and three bales examined with storage periods of 202 to 203 days have all been entirely free from weevils. A study has also been conducted to determine the survival of weevils in bales maintained in the laboratory at an approximate temperature of 70° F., and "salted" with 2,000 weevils per bale at the time of baling in September. These bales were examined at intervals after baling. Living weevils were recovered in all bales examined up to and including 91 days after baling. The following tabulation gives the mortality of weevils in baled hay under the conditions indicated:

Storage period	Dead weevils
	Percent
1 day	11.82
10 days	35.18
31 days	74.47
61 days	99.27
91 days	99.55

It is noted that the vast majority of weevils are killed by 2 months' storage, but after that the few remaining weevils, which presumably are in especially favorable positions within the bale, die off very slowly.

Food consumption of grasshoppers and Mormon crickets.--J. R. Parker, of the Bozeman, Mont., laboratory, reports that in field experiments conducted in Montana during the summer of 1936 rangeland grasshoppers, mostly *Aulocara elliotti* Thomas and *Ageneottix deorum* Scudd., in a two-month period (June 15 to August 15), destroyed 67 percent of the vegetation on plots marked for observation. The average population on June 15 was 22.7 grasshoppers per square meter, and by August 15 they had destroyed 41.0 grams of the 66.7 grams of total growth, or an average of 1.8 grams (dry weight) per grasshopper. On vegetation similar to that on the plots a cow would require slightly over 2 acres of range to provide her with a bare living for the 2-month period and a population of 37 grasshoppers per square meter would destroy as much feed as would the cow. In laboratory studies it was found that 20 adult Mormon crickets, feeding for a period of 20 days at 25° C. (77° F.), consumed 100.9 milligrams of dry food matter per day. At this rate, 1 cricket per square meter would consume approximately 1 pound of vegetation (dry weight) per acre per day; and 16 crickets per square meter, over an acre of vegetation, would consume as much as the minimum requirements of a cow.

Cheaper grasshopper bait.--Mr. Parker also reports that in a field study of materials that might be substituted for bran in grasshopper baits a mixture of one part low-grade flour to nine parts sawdust gave excellent kills. The flour-sawdust-sodium arsenite mixture gave almost as good kills as the standard bait and cost only about half as much.

JAPANESE BEETLE CONTROL

Procedure for purchases of gasoline.--At each Dutch elm disease temporary garage under formal lease a pump unit and an underground tank have been installed, permitting purchase of gasoline under existing Procurement Division contracts at tank-wagon prices. Over 80 percent of our gasoline requirements are filled in this manner. This not only results in lower purchase prices but also eliminates a vast amount of routine clerical work formerly necessary when large quantities of purchase slips had to be matched against duplicates accompanying monthly gasoline vouchers, with consequent delays in payment. Facilities for chassis greasing and minor repair jobs have been provided at the leased garages. In isolated areas, where no garages are maintained, informal short-term competitive bids have been obtained to cover emergency roadside deliveries of gasoline to our drivers. Bills are rendered monthly by the filling-station operators, at prices substantially lower than the posted service-station prices.

Dutch elm disease work.--During the month sanitation crews removed 126,473 dead and devitalized elms, bringing the grand total of dead and dying trees removed since the sanitation campaign began to 1,966,602. Specimens collected from elms exhibiting streaking in the bark numbered 189. Reports for the laboratory included 27 positive cultures, boosting the total of known diseased cases throughout the United States to 21,893. Only 12 recently confirmed trees were standing at the end of the month. The grand total of elms removed in clear-cutting areas is 748,578. In areas to be made free of elms 106,516 trees were treated with copper sulphate bands, making a grand total of 508,518 trees thus medicated since this work was inaugurated in mid-October 1936. Limited scouting for dead and dying trees in New York resulted in the tagging of 49,581 elms for subsequent removal. Total Departmental employees, C. C. C., and State personnel engaged in this work numbered 5,083 at the end of the month.

Large cut in W. P. A. field workers.--Drastic reductions were made in the number of W. P. A. field workers on the Dutch elm disease payrolls, effective on February 10 and 11 and again at the end of the 16-day monthly work period on February 23 and 24. These reductions were made to bring the number of men in Connecticut, New Jersey, and New York down to the quotas that could be carried through until June 30 under an allotment of W. P. A. funds that did not become available until March 4. From a peak of 5,996 laborers of all classes employed in January, the force to be carried into March was cut to approximately 2,400. The quotas of field workers allotted to the respective States are: Connecticut, 290; New Jersey, 1,446; and New York, 606.

Beaver dams broken to enable clear cutting.--To speedily complete a clear-cutting project in a swamp area of Putnam County near Continental Village, N. Y., approximately 100 men were assigned to the area for a brief period to remove 500 trees from a series of confluent lakes formed by beaver dams. Fortified by agreements from the property owners and the State game warden, the beaver dams were broken and the water level lowered approximately 2½ feet. The drained area was clear-cut of elms, since nearly 100 percent of the elm population was dead, the trees apparently having succumbed last summer. Practically all of the trees were heavily infested with *Scolytus multistriatus* Marsh.

Gypsy moth egg clusters on inspected shipments.--Twenty-one shipments, from which 151 gypsy moth egg clusters were removed, were offered for inspection and certification during the month. The heaviest infestation found in any one district consisted of 73 egg masses removed from 5 truckloads of lumber inspected at North Amherst, Mass., prior to transportation to Avon, Conn.

Increased activitiy in Pittsburgh district.--A marked improvement in sales and shipments was shown in February, as reflected in demands for inspection and certification in western Pennsylvania. Owing to floods in some localities early in the month, transportation companies refused to accept shipments of nursery stock presented for shipment to consignees in flooded areas or in districts where transportation would be through flooded areas to localities beyond. No classified establishments in the regulated area were directly affected by the record-breaking floods.

Japanese beetle emergence in greenhouses.--By the middle of the month beetles became more numerous in greenhouses in the Philadelphia district, particularly in ranges run with high temperatures. Several rose growers assigned employees to hand-pick the beetles daily before they had time to damage the blooms. On February 15 two agents from the White Horse, N. J., laboratory collected 175 adults for use in the experimental work with nematodes. By the end of the month 485 adult beetles had been collected from a few greenhouses, for the use of research workers in Washington, D. C.

Equipment-conditioning project at St. Louis completed.--An equipment-conditioning program, part of the W. P. A. Japanese beetle trapping and control project in St. Louis, Mo., was concluded on February 19. The work included reconditioning and painting of the trap assemblies and other equipment and refilling the bait bottles with the liquid geraniol-eugenol-phenyl alcohol bait combination.

Surveys started in West Virginia and Ohio.--Late in February two inspectors were assigned to visit all nurseries and greenhouses in the Ohio infested districts to be placed under regulation, effective March 1. The inspector stationed at Hagerstown, Md., also started a similar survey of commercial establishments in the West Virginia area that will be added to the regulated zone.

FOREST INSECT INVESTIGATIONS

Eastern spruce beetle.--H. J. MacAloney, of the New Haven, Conn., laboratory, reports as follows: "The eastern spruce bark beetle (*Dendroctonus piceaperda* Hopk.) is killing mature and overmature red spruce in the Adirondack Mountains, N. Y., having been reported from the vicinity of Morehouseville, in the southern part of this district, and on the slopes of

Mount Marcy. In company with L. D. Casey, part of the 3,000-acre infestation at Morehouseville was examined and found to be serious. The number of trees dead is relatively small, but many are so heavily attacked that they will die before summer. This infestation is of comparatively recent origin and is a potential menace to a large area farther north, having mature spruce at higher elevations. The New York Conservation Department has been advised to make a general reconnaissance of all mature stands in the Adirondacks and to ascertain the extent of the infestation."

Chemical treatments of elm stumps.--In connection with the Bureau's Dutch elm disease eradication project, large numbers of elm trees are cut down and destroyed. It is desirable to so treat the stumps that sprouting and insect attack will be prevented. The method first used for this purpose consisted of debarking the stump to 6 inches below ground level. This proved to be difficult, especially when the ground was frozen or when the stumps had deep indentations, and the Division of Forest Pathology, of the Bureau of Plant Industry, began experiments in which various chemicals were applied to the stumps. In November 1935 the Morristown, N. J., laboratory began to cooperate with the Division of Forest Pathology in these experiments. R. R. Whitten, of the Morristown laboratory, has reported regarding these experiments under date of February 16. The following statement is taken from his report: "In three plots established in New Jersey the elms were cut and the stumps treated in November 1935, February 1936, and June 1936, respectively. Each stump was measured and given a permanent number and a record was kept of the treatment given. In treating the stumps the bark was loosened for a distance of 3 inches from the top, and the dry chemical salt was poured into the space between the bark and the wood. The bark was then nailed back in place. The chemicals used were commercial grades of granular copper sulphate, granular copper sulphate plus granular calcium chloride, granular calcium chloride, zinc chloride, sodium arsenate, sodium arsenite, mercuric chloride, sodium fluoride, sodium cyanide, and sodium nitrate. Three dosages, based on stump diameter, were used with most of the chemicals. Untreated stumps were included in each plot. General observations were made during June 1936, in the plots treated in November 1935 and in February 1936. This was done without disturbing the bark, in order to allow the stumps to remain unmolested during an entire growing season. In December 1936 all stumps were debarked and notes made on the occurrence of live wood, sprouts, and insect attack." In summarizing the results of the experiments, Mr. Whitten concludes that there was no marked difference in the effectiveness of the chemicals when applied in the fall, the winter, or the spring season. There was no relation between the dosages used and the control obtained, indicating the advisability of developing a method to prevent the chemicals being washed away by heavy rains. Considering toxicity to stump, prevention of sprout growth, and prevention of insect attack, sodium arsenite and sodium arsenate were most effective, followed by copper sulphate plus calcium chloride and sodium fluoride.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Progress of the gypsy moth project.--At the end of February the number of W. P. A. workers employed on the various phases of gypsy moth work had decreased to approximately 2,200. Since July 1, 1936, these men have located and destroyed more than 1,440,000 egg clusters. They have scouted nearly 2,050,000 acres and over 8,660 miles of roadsides. Approximately 6,860 acres of woodland were thinned and more than 5,930,000 trees in open country were examined.

No infestation in the barrier zone in Vermont.--No infestation has yet been found within the barrier zone in the State of Vermont. Several infestations have been found in the Massachusetts portion of the zone but they have been small, usually only a single egg cluster; however, in the Connecticut part of the zone several sizeable infestations have been discovered, particularly in Canaan and Cornwall.

Scouts find second old egg cluster in Indian Township, Maine.--A second old egg cluster was discovered by the small force of W. P. A. workers engaged in special work in Indian Township, Washington County, in the vicinity of the new egg cluster located in January by a University of Maine student. The first old egg cluster was found in January approximately 550 feet south of the new egg cluster, and the second one was found about 1,200 feet southeast of the original egg cluster. The woodland growth in the immediate vicinity of the last egg cluster is particularly unfavorable for the development of the gypsy moth. Scouting has been completed at this location and no further evidence of the gypsy moth's presence was discovered.

New egg clusters found at infestation in Princeton, Maine.--Six egg clusters were located by W. P. A. workers during the second week in February in the region of the infestation discovered last summer in Princeton, Washington County. This makes a total of 31 new and 2 old egg clusters destroyed by creosoting at this infestation.

Gypsy moth crew now working near Canadian border.--The small force of W. P. A. workers assigned to duty under the supervision of a regular employee of this activity has started intensive scouting work in Baileyville, Washington County, Maine, where an infestation was discovered last summer. Baileyville is located directly east of Princeton, and is separated from the Canadian Province of New Brunswick by the Saint Croix River. No evidence of gypsy moth infestation has been discovered to date.

Eradication work continued at two infestations in New York State.--Federal W. P. A. workers engaged in gypsy moth scouting and eradication work in Shawangunk, Ulster County, N. Y., continued intensive work in the region of the infestation discovered in that town. These men have creosoted 22,642 egg clusters, in addition to those destroyed by regular employees of the New York Conservation Department incidental to their regular work. C. C. C. Camp enrollees and State employees paid from regular funds have continued to do intensive work in the area surrounding the infestation found in Putnam Valley, Putnam County, N. Y. They have destroyed 27,949 egg clusters by creosoting. Approximately 2,000 acres are known to be infested in this locality.

No infestations found in New Jersey.--W. P. A. gypsy moth work is being continued in New Jersey under the supervision of regular State employees who are thoroughly experienced in all phases of the work. The results have been negative to date.

Infestation apparently eliminated in Dyberry, Pa.--The W. P. A. workers engaged in intensive scouting work in the region of the infestation in Dyberry, Wayne County, failed to locate any additional egg clusters in February and the scouting work is now completed in this town. Apparently the infestation has been eradicated. A total of 325 new and 51 old egg clusters was located and destroyed. This indicates a yearly rate of increase of approximately six to one, although the growth is more than 80 percent unfavorable to gypsy moth development. The normal rate of increase in the eastern part of the generally infested area in New England, prior to large-scale liberations of parasites, was considered to be six new to one old egg cluster.

No new egg clusters found at infestation in Clinton, Pa.--No additional egg clusters were found in Clinton Township, Wayne County, Pa., in February. The infestation discovered last December has apparently been eliminated. A total of 99 new egg clusters was destroyed at this infestation in January in growth considered largely unfavorable for the development of the gypsy moth. Assembling cages were set out in Clinton in the summer of 1934 and records show that nine of them were placed within a 1-mile radius of the recently discovered infestation. Two of these cages were less than ½ mile and one other was slightly more than ½ mile from this colony, but no male moths were recovered. Work has been started in some of the townships adjacent to Clinton and Dyberry, particularly in Clifford in Susquehanna County and in Oregon, Lebanon, Mt. Pleasant, and Paupack, in Wayne County. No infestation has been found in these towns.

Human skeleton found by gypsy moth scouting crew.--A crew of W. P. A. workers, scouting for the gypsy moth under the supervision of a regular Federal employee, discovered a human skeleton in a lonely wooded gully near Rita, Wright Township, Pa.

Progress of C. C. C. gypsy moth work.--During the period from July 1, 1936, to February 28, 1937, the C. C. C. camp enrollees engaged in gypsy moth work in towns east of the barrier zone in Massachusetts, Connecticut, Vermont, and New Hampshire scouted nearly 727,000 acres, more than half of the acreage being in Vermont, and more than 1,900 miles of roadsides. They examined approximately 870,000 isolated trees and nearly 41,800 yards of stone walls. About 3,860 acres of woodland were cleaned and thinned, approximately half of it being in Massachusetts. That State contained more than 4,000,000 of the 4,400,000 egg clusters treated during the fiscal year.

Increase in gypsy moth C. C. C. crews.--A daily average of 1,526 C. C. C. camp enrollees were engaged in gypsy moth work east of the barrier zone during the last week in February, a substantial increase over the 1,171 men similarly employed the last week in January.

Cooperative work begun in type-mapped area.--Work is progressing in the woodland block in the northern part of Greenfield and the southern parts of Bernardston and Leyden, Mass., where type-mapping has been completed by the E. C. W. forester working in cooperation with this Bureau. This block is to be treated for silvicultural benefits, as well as for gypsy moth control. The area is being surveyed to ascertain the number of egg clusters per acre in the different sections, the egg clusters are being creosoted, and chopping will be started when the survey is completed. Thinning, creosoting, and burlapping were done in some parts of the area last year. The area chosen for type-mapping contains a great variety of forest growth typical to this part of New England.

Pure white pine stand being established in Gill, Mass.--C. C. C. enrollees from the Montague camp are working in a section of Gill, which is largely a white pine growth but containing pockets of grey birch and scattered large white oaks. Most of the oak trees are heavily infested with gypsy moth egg clusters. These oaks are being removed, together with the gray birches, and will leave a practically pure stand of white pine. This section should require no further gypsy moth treatment in future years, other than removing sprouts of favored food plants.

Proposed 5-year plan for gypsy moth C. C. C. camps.--A plan of work based on a 5-year period has been prepared and presented to the Forest Service in Washington at the request of the regional forester. The acreage of the counties or parts of counties involved in the program is approximately 3,500,000, and the plan contemplates covering this acreage from two to five times, depending on the requirements of the different sections. The proposed work will require approximately 2,666,000 man-days. All of the work will be done in the area east of the barrier zone. Twenty-one camps have been requested--7 in Vermont, 6 in Massachusetts, 5 in Connecticut, and 3 in New Hampshire. The suggestion has been made that 157-man camps be established rather than the 200-man camps previously proposed.

Progress of brown-tail moth work.--There were 1,345 W. P. A. workers employed on brown-tail moth projects in Maine, New Hampshire, Vermont, Massachusetts, and Connecticut the middle of February. From July 1, 1936, to February 13, 1937, these men have cut and destroyed more than 1,940,000 winter webs in Maine, New Hampshire, and Massachusetts. No webs have been discovered in Vermont or Connecticut. More than 29,300 miles of roadside were scouted and over 127,500 trees were cut. Approximately half of the trees cut were in New Hampshire. Nearly 14,000,000 trees were examined, distributed rather evenly through all of the States except Connecticut, where work was begun recently.

Scouting for winter webs of the brown-tail moth begun in Connecticut.--Scouting for brown-tail moth winter webs was started in Connecticut the first week in February. It is planned to cover a comparatively small group of towns adjoining the Massachusetts and Rhode Island State lines, from the Connecticut River eastward.

Favorable scouting conditions permit unusually thorough work.--Heavier infestations than had been anticipated were found in some sections of the territory, originating from webs on low growth. The winter of 1935-36 was characterized by particularly heavy falls of snow, and the low growth in many sections was completely covered and could not be inspected by the scouts. In contrast, weather conditions during the present winter have been unusually favorable for this type of work. The slight snowfall and comparative lack of stormy weather has provided almost ideal scouting conditions; consequently much of the infested territory has been covered more thoroughly than is usually possible.

Work of ground crews supplemented by specially trained high climbers.--Practically the entire time of most of the crews on this project is devoted to scouting for infestations, cutting and burning winter webs, and eliminating favored food plants, in order to decrease the opportunities for infestations to persist. Infested towns are not considered completed until all the winter webs located have been destroyed. The ground crews eliminate as many of the webs as they can reach and are followed by small crews of specially trained high climbers, who work independently, cutting the webs from the higher trees.

PLANT DISEASE CONTROL

Barberry eradication during the winter.--Survey work in Minnesota during the winter months has been restricted to hilly districts in the southeastern part of the State. Late in December work was suspended in Brown, Yellow Medicine, Faribault, and Nicollet Counties, where side roads became blocked with snow and conditions otherwise were unsuitable for field work. Men assigned to this project have lost little time on account of inclement weather. L. W. Melander, in charge of the barberry-eradication program in Minnesota, reports that during the calendar year 1936 an intensive survey was made of 5,368 square miles of area, and that 2,936 man-months of relief labor were used in the eradication of more than 10,600 bushes on 611 different properties. During the year bushes were removed from approximately 150 properties in the cities of Minneapolis and St. Paul. During the year 25 locations were found where rust was observed to have been spreading from barberry bushes to susceptible grains and grasses. For the purpose of obtaining information on the early history of barberries in Missouri, George M. Frandsen, State leader, recently mailed questionnaires to 150 property owners on whose premises barberry bushes had been destroyed. The object was to determine the approximate age of the bushes that had been planted and the source from which the original plants were obtained, as well as to collect data on the number of years the bushes had been spreading seed. Some bushes were reported as having been planted as early as 1869 and in these communities considerable natural spread has occurred. Apparently few common barberry bushes have been planted during the last 20 years, and Mr. Frandsen states that very few nurseries in Missouri have been selling susceptible species of barberries since 1918, even though Missouri has not been included with the States protected by the Federal quarantine.

Blister rust control in the Northeast.--Final figures for blister rust control work in the Northeastern States for the calendar year 1936 show that 1,784,378 acres were cleared of 55,668,747 wild and 73,926 cultivated Ribes bushes by the use of 527,574 man-days of labor. The acreage protected represents a 58.6-percent increase over 1935. Over 66 percent of the total acreage was worked under the W. P. A. program and about 31 percent with E. C. W. labor. Nursery sanitation measures were applied around 32 pine-growing nurseries and 13,799 acres were cleared of 14,826 wild and 220 cultivated Ribes. During the period 1918 to 1936, inclusive, a total of 217,255,718 Ribes have been destroyed on 13,900,191 acres, of which 19.2 percent, or 2,678,986 acres, was reeradication work aimed at maintaining control of the disease on protected pine-production areas.

Blister rust control in the Southern Appalachians.--In February Ribes-eradication work was carried on in Georgia, North Carolina, Tennessee, and Virginia. The weather was so mild that it was possible to uproot the Ribes without encountering frozen ground. Under the W. P. A. program, 154,682 Ribes bushes were destroyed on 144,360 acres by an average of 196 men, who put in 21,444 man-hours of labor. All of the bushes in North Carolina and Georgia were cultivated, as were 1,792 of those in Virginia. In cooperation with the Soil Conservation Service, 56 cultivated Ribes were removed in Virginia. The Soil Conservation Service furnished the labor for this work. Pine surveys were carried on in all of the Southern Appalachian States. In western Maryland from December 1936 to February 1937, inclusive, a total of 2,781 diseased pines were salvaged by cutting out the infected parts, but 73 were so badly diseased that treatment was not practicable and they were removed.

COTTON INSECT INVESTIGATIONS

Field examinations for hibernating pink bollworms.--Examinations of the plants, surface trash, and soil samples to determine the population of pink bollworms in the fields of the Big Bend district were completed in January by H. S. Cavitt and O. T. Robertson, of the Presidio, Tex., laboratory. After the crop was harvested the plants and crop debris on the surface of the ground and the soil to a depth of from 3 to 5 inches were examined on 5 square yards in each of 25 fields representing different intensities of infestation, plant growth, and soil type. The number of larvae on the plants and in surface trash ranged from 3.6 to 114, with an average of 27 per square yard for all fields. The number of larvae in the soil ranged from 1.2 to 13.6, with an average of 4.33 per square yard.

Last year the averages for all fields were 43 larvae above ground and 12.5 larvae per square yard in the soil. During the five years 1932 to 1936, for which records are available in 9 identical fields, the populations were 9.0, 16.0, 15.0, and 37.0, and 26.0 larvae per square yard above ground and 1.01, 2.28, 1.37, 13.46, and 3.75 larvae per square yard, respectively, in the soil. The average percentage of the overwintering population found in the soil this year was 13.78, as compared to 22.58 in 1935. The numbers of overwintering larvae in the fields were markedly reduced this year, notwithstanding a heavier infestation in green bolls during the early growing season. This reduction is thought to be due to earlier maturity of the crop with fewer green bolls during October, earlier killing frost, and cleaner picking of the low-grade damaged cotton. Examinations were also made of the numbers of larvae on plants and in surface trash on 100 square yards in each of two heavily infested fields before and after the fields were cleaned. Before cleaning an average of 36.2 larvae, and after cleaning 2.6 larvae per square yard were found, or a reduction of 71 percent of the larvae above ground was caused by cleaning. The numbers of larvae remaining after the clean-up were 2.4 and 10.2 per square yard, or 24,000 and 62,000 larvae per acre. The numbers left in the surface trash were approximately the same (2.51 and 2.63 per square yard) in the two fields, the difference being due to the larvae in the soil, which could not be reached by the clean-up.

Uncleaned fields increase pink bollworm infestation.--C. S. Rude reports an observation on the effect of leaving infested cotton bolls and plant debris in uncleaned fields on the pink bollworm infestation the following season. Infestation records were made in 14 fields near San Pedro, Coahuila, Mexico, on May 29, 1936, and in 12 of the fields examined the infestation was below 10 percent but very much higher in the other two. "In searching for an explanation of the heavy infestation in the two fields," Mr. Rude says, "it was found that there was a 900-acre field between them which had been in cotton in 1935. The stalks had been cut in this field in November and nothing more had been done. An examination in May showed an average of over 100 locks of cotton per square yard on the soil surface. On June 10 another series of counts was made. At a point bordering the neglected field the infestation was 76 percent. At a point about 75 rows farther into the field and away from the neglected field the infestation was 58.1 percent. At a point 150 rows into the field and away from the neglected field the infestation was 35.7 percent. At a point 1 mile distant from the neglected field and in the same direction as the other points mentioned, with continuous cotton, the infestation was 7.5 percent. These counts indicate that the neglected field served as the principal carry-over for the pink bollworm in the region and that the infestation gradually spread from this field throughout the surrounding cotton fields. For a distance of at least ½ mile on all sides of the neglected field the cotton crop was so badly damaged by the pink bollworm that no cotton was picked from the fields."

Cotton flea hoppers emerge early.--K. P. Ewing and R. L. McGarr report the earliest emergence of cotton flea hoppers this year in the hibernation cages at Port Lavaca, Tex., that they have ever recorded. Three nymphs were taken on February 8 and 143 nymphs emerged during the month. No emergence occurred in comparable cages in February of last year and the previous record of early emergence was on February 12, 1934.

Varietal resistance of cotton to boll weevil.--The percentages of boll weevil-infested squares on 40 or more commercial varieties of cotton grown in adjacent rows were recorded during 1934 to 1936, inclusive, by E. W. Dunnam, Stoneville, Miss., to determine whether there was any varietal resistance. The weevil infestations were very light in 1934 and 1935 and no infestation was found in 1936. The infestation records were made around July 20, July 31, and August 10. By the last-named date some varieties were practically through fruiting and had an average of less than one square per plant. It was expected that the square infestation would be higher in the varieties with fewer squares. This was not the case, however, as the weevils moved freely between the different varieties in adjacent rows and there appeared to be no correlation between the diminishing number of squares and square infestation or between square infestation and boll damage in individual varieties. In 1935 dated tags were placed daily on 25 blooms of each variety, beginning on July 9 and continuing as long as sufficient blooms were available, usually about August 20 to 25. The open bolls were assorted according to the date of blooming and were examined for weevil damage, to determine the relation of boll damage to date of blooming. There was very little damage to bolls of any of the varieties until after the squares (their preferred food) became scarce and the weevils had to depend on bolls for feeding and breeding. In all varieties the bolls produced from blooms opening in July averaged less than 3 percent of damaged locks of cotton, whereas 20 percent of the locks produced after August 1 by the early fruiting, thin-hulled varieties, and 16 percent of those of the late-fruiting, thick-hulled varieties were damaged or destroyed. Although the bolls of the thin-hulled varieties were more severely damaged by weevils, they set a larger number of bolls and produced about 13 percent more undamaged locks than the late-fruiting, thick-hulled varieties.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Wild-cotton eradication.--The eradication of wild cotton in southern Florida made satisfactory progress in February. At the beginning of the month several counties on the west coast had been recleaned, but a second recleaning was begun to prevent any plants from maturing fruit. The plan is to reclean these counties now and at the same time thoroughly scout the areas to be sure that all wild cotton has been located. After this has been done, it will be necessary to revisit only the known locations of cotton. To give some idea of the progress being made, only 271 seedling plants were found during February in the counties of Hillsborough, Manatee, and Pinellas. With the exception of a small colony in Pasco County, the above three counties are the northernmost ones in which wild cotton has been found along the west coast. Crews have also been operating in the other west-coast counties, and a good many plants have been removed. Several crews are working on the mainland keys and are making good progress. A considerable number of seedling plants have been removed, but only six mature plants were found in February. These mature plants were all in the vicinity of a colony cleaned for the first time last season. On Cape Sable the work is not progressing as fast as during previous clean-ups, but even so it does not appear that very many bolls have matured. In all of the areas any mature bolls are carefully gathered before the plant is removed so as to avoid any chance of scattering seed, thus producing additional plants later on. In February several new colonies were located and cleaned. These covered only 6½ acres and contained 340 mature plants and 975 seedlings. The recleaning covered approximately 5,100 acres from which 43 mature, 201,412 seedling, and 814 sprout plants were removed. In addition, some 8,000 acres were scouted without finding any wild cotton.

Thurberia-plant eradication.--In the eradication of Thurberia plants in the Santa Catalina Mountains of southern Arizona better progress was made in February than in January. A total of 2,280 acres was covered, from which 56,043 Thurberia plants were removed. All of the work was performed using the camp in Sabino Canyon as a base. In March it will probably be necessary to move the camp to a new site, as most of the territory readily accessible from the present site has been gone over.

Laboratory inspection.--The inspection of green-boll samples at the San Antonio laboratory has gone forward satisfactorily. Some material has also been inspected at some of the field stations. The results in February were negative.

Road-station inspection.--In February only one interception was made at the Marfa, Tex., road station. This interception consisted of two pick sacks, in which four locks of seed cotton were found. An inspection of the seed cotton resulted in the finding of two living pink bollworm larvae. Toward the end of the month the record of cars indicated that very little dangerous traffic was moving, consequently the station was discontinued on February 28. During the time the station was operated over 6,000 cars were inspected and 47 interceptions were made. Of this number, 24 were infested with the pink bollworm, 123 living and 24 dead specimens being found. Cars from which 7 of the interceptions were made, containing 26 living and 12 dead specimens, were moving to other cotton-growing areas.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Efficiency of rotenone compounds against larvae of vegetable weevil.--In field experiments directed against the turnip aphid (*Rhopalosiphum pseudobrassicae* Davis) on turnips and mustard, by P. K. Harrison, at the Baton Rouge, La., laboratory, it was incidentally shown that dust mixtures containing 1.0 percent rotenone, with equal parts of finely ground dusting sulphur and tobacco as the diluent, and derris sprays containing approximately

0.02 percent rotenone, with or without a diphenyl butyl sodium sulphonate (1-1,000) as a spreader and wetting agent, were effective in protecting the turnips and mustard from damage by larvae of Listroderes obliquus Klug. The check plots and also the plots that received applications of sprays or dust mixtures containing nicotine sulphate were badly injured by the weevil larvae. The insecticide applications were begun when the plants and the infesting weevil larvae were small. They were repeated at intervals of 14 days, from four to six treatments being applied. In laboratory experiments performed by K. L. Cockerham and O. T. Deen, at the Biloxi, Miss., laboratory, it was found that sprays containing approximately 0.025 percent rotenone, with or without a diphenyl butyl sodium sulphonate (1-600) as a spreader and wetting agent, were not effective against either quarter-grown or larger L. obliquus larvae. Judging from these preliminary experiments, rotenone compounds may be effective against L. obliquus when applied to plants infested with small larvae.

Beet leafhopper conditions in southern Idaho presage low spring population.--J. R. Douglass and associates, of the Twin Falls, Idaho, laboratory, report that, on the basis of conditions existing in February in Twin Falls, Jerome, Minidoka, and Cassia Counties, southern Idaho, it appears that the season has been unfavorable for survival of Eutettix tenellus Bak., and a low spring population is indicated. Fall populations of E. tenellus in 1936 showed a decrease over those of 1935, even though there was considerable increase in the acreage of Russian-thistle, its principal summer host plant. Fall temperatures above normal, accompanied by deficient precipitation, prevented the germination of mustard, ordinarily the natural fall and winter host plant of E. tenellus. This forced the leafhopper to remain on undesirable host plants and enter the winter under very unfavorable conditions. Subzero temperatures were recorded throughout southern Idaho 11 times in January and were evidently unfavorable to E. tenellus, especially at the time when very little snow cover was present; however, the full effect of the subzero weather in January and February was reduced by snow coverage. Excessive soil moisture in February, due to precipitation and to melting of snow, has been detrimental to leafhopper survival. The percentage of leafhoppers recovered from hibernation cages containing favorable host plants was one of the lowest on record, female leafhopper survival averaging approximately 15.7, 17.4, and 26.9 percent, respectively, for Berger, Twin Falls, and King Hill. The percentage of winter survival increased with the decrease in elevation. Even in years of generally low survival, moderate populations of leafhoppers may be expected in beet-growing areas located close to leafhopper breeding grounds. Since spring conditions have a profound effect on leafhopper populations, as well as on the time of their migration into beet fields, further studies will be necessary to determine definitely the probable status of the leafhopper in southern Idaho this year.

Survival of sugar beet wireworm roughly proportionate to saturation deficiency of air.--In a series of laboratory tests with larvae of the sugar beet wireworm (Limonius californicus Mann.), designed to determine the combined effects of temperature at different humidities on the survival of wireworm larvae, E. W. Jones, of the Walla Walla, Wash., laboratory, reports that the survival appeared to be roughly proportionate to the saturation deficiency of the air at temperatures of 68° and 77° F., respectively, and throughout a range of relative humidities extending from 90 to 100 percent. This comparatively simple relation to saturation deficiency did not persist at 86°, however, because at that temperature the duration of life of the wireworms was much shorter than at the same saturation deficiency and a lower temperature. In connection with these experiments it should be emphasized that the larvae of *L. californicus* are very sensitive to desiccation and usually die in a few days when exposed to ordinary atmospheric humidity. Their survival for extended periods can be obtained only when they are placed in the soil, in saturated air where droplets of water condensation are present, or in water. These experiments were performed, therefore, only at relative humidities of 90, 96, 98, 99, and 100 percent.

Methyl bromide as a fumigant against cigarette beetle.--W. D. Reed, of the Richmond, Va., laboratory, reports that recent results obtained in vacuum-fumigation tests with a commercially prepared methyl bromide-carbon dioxide mixture against *Lasioderma serricorne* Fab. indicated that this mixture is a promising fumigant. Eight tests were performed in February in the fumigation of Puerto Rican cigar-filler tobaccos in vacuum, in cooperation with one of the tobacco companies. Four of these tests were carried out with a mixture of 3-1/2 pounds of the methyl bromide to 46-1/2 pounds of carbon dioxide, and in the remaining four tests 5 pounds of methyl bromide to 45 pounds of carbon dioxide were used. The period of exposure was 4 hours in all of the tests and the dosage was 41.9 pounds of the fumigant per 1,000 cubic feet of space, or 5.6 pounds of the fumigant per ton of tobacco. The results of the tests are as follows:

Mixture	Insects		
	Treated	Alive	Mortality
	Number	Number	Percent
Methyl bromide, 5 pounds-45 pounds carbon dioxide	1,500	10	99.3
Methyl bromide, 3½ pounds-46½ pounds carbon dioxide	1,500	76	95.0
Checks	625	603	3.5

The temperature of the tobaccos at the beginning of the tests ranged from 55° to 58° F. In the presence of these relatively low temperatures the percentages of mortality obtained are very satisfactory.

Mexican bean beetle shows no preference in selecting hibernation materials.--R. L. Wallis, of the Grand Junction, Colo., laboratory, reports that in a series of cage tests to determine preferred hibernation materials for *Epilachna varivestis* Muls., in which six different materials were made available to hibernating beetles, no significant preference was shown for pinon needles, pine needles, oak leaves, bean hulls, poplar leaves, or wild grass. Fewer beetles entered the pinon needles than any of the other materials, probably because these needles pack closely and it was difficult for the beetles to get under them. Approximately 30 percent of the beetles did not enter any of the materials provided but attempted to hibernate in cracks and crevices in the cage.

Rotenone-containing dust mixtures and sprays give good control of Mexican bean beetle.--In summarizing the results of insecticide tests performed against the Mexican bean beetle in 1936 on Fordhook lima beans, L. W. Brannon, of the Norfolk, Va., laboratory, reports that the best control was obtained with dust mixtures of derris-sulphur and cube-sulphur, each containing 0.5 percent rotenone. Derris-wettable sulphur and cube-wettable sulphur sprays (each containing 0.01 percent rotenone) also gave good control of the insect. The percentage of control with the dust mixtures was slightly superior to that obtained with the sprays. Sprays containing 3 pounds of cryolite to 50 gallons of water gave poor control of the bean beetle, as did also a dust mixture containing 60 parts of cryolite and 40 parts of sulphur by weight. The cryolite spray, however, gave slightly better protection against the bean beetle than did the dust mixture.

INSECTS AFFECTING MAN AND ANIMALS

Flood control and mosquito problems.--At a joint hearing held by Army engineers and Forest Service officials at Salem, Oreg., on February 25, H. H. Stage presented a brief statement on the relation of flood control to mosquito problems in the Willamette River watershed.

Mosquito-control work resumed in Georgia.--J. B. Hull of the Savannah, Ga., laboratory, reports that pest-mosquito control, which was started under the C. W. A., has been resumed on a county-wide basis under the auspices of the W. P. A. on Tybee Island, Ga. The work consists of dike and ditch construction and the installation of automatic tide gates.

Screwworm activity.--A. L. Brody, of the screwworm-fly research project, reports that at the Valdosta, Ga., and Gainesville, Fla., laboratories there was limited activity and breeding of the primary screwworm fly (Cochliomyia americana C. and P.) under controlled outdoor conditions in February. D. C. Parman, of the Uvalde, Tex., laboratory, reports some activity of this species in the vicinity of Uvalde. Observations made by W. L. Barrett in the vicinity of Catarina, Laredo, Zapata, Rio Grande City, Encino, George West, De Hanis, Crystal City, and Alice, Tex., during the period from January 15 to February 15, indicate that C. americana was most abundant along the Rio Grande from Laredo to Rio Grande City.

Effect of cold and irradiation on the development of stable fly.--C. W. Eagleson of the Dallas, Tex., laboratory, studying the biology of *Stomoxys calcitrans* L., reports the following results of preliminary experiments: Cultures of pupae were held in a cold room at 15° C. (59° F.) from December 17 to January 19. A moderately high mortality was noted, but about 1,000 adults emerged. Their vitality was less than that of insects caught in the field on February 4. The egg production was very low, and the fertility of the eggs was low. About 80 percent of the eggs failed to hatch. Pupae held at 4° C. (39.2° F.) for 4 weeks failed to emerge. Fifty pupae were removed weekly and allowed to emerge at 27° C. (80.6° F.). The results were: Refrigerated 1 week, 98 percent emergence; 2 weeks, 82 percent emergence; 3 weeks, 36 percent emergence; 4 weeks, no emergence. A lot of 100 flies was held at 4° C. (39.2° F.), but removed and offered food in a warm room (25° C.) (77° F.) each day. On the twelfth day 94 percent of the flies were dead. It was noted that withholding food and water from flies held in low humidity caused a high mortality (68 percent) in 24 hours, whereas among similar flies in moist air there were no deaths. Adults irradiated roughly 7 hours per day with a General Electric CX 250-watt infrared-ray bulb oviposited about 1 day sooner than did control flies held in dim light. After 4 days the lots had laid approximately equal numbers of eggs, of equal viability. Mortality in the two lots is equal. There appears to be no advantage in irradiating breeding stock.

FOREIGN PARASITE INTRODUCTION

Citrus blackfly parasite in the Bahamas.--In 1931 P. A. Berry colonized the Malayan parasite *Eretmocerus serius* Silv. at Nassau on the island of New Providence. This parasite has completely controlled the blackfly in Cuba and various other West Indian islands and in Panama. Interceptions of infested lime foliage at Miami in 1936 indicated that control in the Bahamas might not have been attained. In February of this year C. P. Clausen visited Nassau to determine the status of the fly and its parasite. The 10-acre grove in which the parasite was first colonized was found to be heavily infested and at no time since its first liberation had the parasite exerted any appreciable check on the pest. Adult parasites were abundant on the foliage. Nearby groves, which had been just as heavily infested in 1931, were commercially clean in a short time and have remained so. No infestations have developed on young plantings. Most dooryard trees were clean, although a number were found to be heavily infested. Grapefruit trees invariably carried the greatest infestation. This is the first instance since the introduction of *Eretmocerus* into subtropical and tropical America that full field control has not been attained.

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Two larvae, 29 puparia, and 1 adult, all living, of the olive fruit fly (*Dacus oleae* Gmelin) arrived at New York on January 11 among fresh olives in baggage from France. This is the first time this fruit fly has been intercepted at an American port from France. Living adults of *Bruchus dentipes* (Baudi) were found at Detroit, Mich., on January 13 in a shipment of fava beans (Vicia faba) from Syria. Living larvae of the bean pod borer (Maruca testulalis Geyer) were intercepted at San Francisco on December 18, 1936, in string beans in ship's stores from Java. Living specimens of the whitefly Dialeurodes chittendeni Laing were taken at Washington, D. C., on February 15, 1936, on rhododendron in express from the Netherlands. A living specimen of the cicadellid Stirellus mexicanus Osb. was found at Brownsville, Tex., on December 6, 1936, on lettuce in baggage from Mexico. Five living larvae of the turnip gall weevil (Ceutorhynchus pleurostigma Marsh.) were taken at New York on December 11, 1936, in turnip roots in ship's stores from Poland. A living specimen of the chermid Psyllia peregrina Forst. arrived at Boston on June 16, 1936, on a cut flower of hawthorn in the mail from England. Living larvae and pupae of the celery fly (Philophylla heraclei L.) were intercepted at Philadelphia on November 26, 1936, in celery leaves in ship's stores from England. This trypetid, which is not known to occur in the United States, was formerly known as Acidia heraclei L.

Important fruit-fly interception.--Eleven living larvae of Anastrepha grandis (Macq.) were taken at Houston, Tex., on January 4 in two pumpkins in ship's stores from Argentina. This trypetid was originally described by Macquart from New Grenada in 1846. Max Kisliuk, Jr., and C. E. Cooley reared this species from watermelon in Brazil in 1931 and received adult specimens bred from oranges from the same country. There are also records of its having been obtained from cucumber, squash, and other cucurbits. It is also known to occur in Paraguay and Peru. It pupates in the ground, the pupal stage lasting from 20 to 26 days.

Orange pest from Brazil.--A larva of Gymnandrosoma aurantianum da Costa Lima was intercepted at New Orleans on November 11, 1936, in an orange in ship's stores from Brazil. Messrs. Kisliuk and Cooley found this olethreutid in Valencia orange, sour orange, and tangerine in Brazil. Da Costa Lima records a larva of this species having been taken on guava.

Pink bollworm interception in Puerto Rico.--A living pupa of the pink bollworm (Pectinophora gossypiella Saund.) was intercepted at the post office at San Juan, P. R., on February 2, in a cotton seed from Santurce, P. R. Of the approximately 100 bolls in the package, H. G. Taylor examined 2 and found 1 showing evidence of infestation and the other with a pink bollworm pupa. The package was addressed to New York.

Another foreign disease found in the United States.--Phytophthora cryptogea Pethyb. and Laffer, which is listed in Stevenson's manual as causing a disease of tomato and Cineraria seedlings in Great Britain and was later found to attack several hosts in Australia, has been found to be responsible for the destruction of several outdoor plantings of marigold in New York, according to an article by R. P. Pirone in the Florists Exchange (88:52, February 6, 1937). Marigold plants attacked out of doors were a foot high and half grown or older, but in the greenhouse plants of all ages seemed to be susceptible. Death follows infection so rapidly that it is doubtful whether the disease was introduced on plants, if all hosts succumb as quickly as marigold. Dr. Pirone states that the fungus was found capable of producing seed decay. It is therefore possible that it was introduced on flower seeds. As the fungus can live over in the soil, eradication would be expensive.

Names for nemas infesting yams.--The new species of *Hoplolaimus* intercepted in yams from Nigeria (see News Letter 2:21, June 1935) is described by G. Steiner (Proc. Helm. Soc. Wash. 4:35, figs. p. 34, January 1937). The name of the genus was changed by Filipjev in 1936, therefore the name of the new species is *Rotylenchus blaberus* Steiner. The name of the nema described from a Jamaican yam intercepted in 1931 (see News Letter No. 10, p. 5, Oct. 1931) is now *Rotylenchus bradys* (Steiner and Le Hew) Filipjev instead of *H. bradys*.

New nema in Saccharum flowers.--Diseased flowers of *Saccharum spontaneum* from Arlington Farm were found to contain numbers of nemas of the seed-infesting type. The species, evidently new, has been named *Anguina spermophaga* by Dr. Steiner (Proc. Helm. Soc. Wash. 4:36-38, January 1937). The infested plants were grown from seed collected in Turkestan and the seed may have carried the parasite.

DOMESTIC PLANT QUARANTINES

Peach-tree removal well advanced.--Of the 247 counties in which the removal of useless peach trees has been undertaken since July 1935, at the close of the calendar year 1936, 75 percent were completed. Seedlings are expected to appear from time to time, necessitating a check to protect accomplishments to date. This project, conducted for the control of the phony peach disease, represents activity in nearly one-fourth of the States of the Union, and has provided emergency-relief employment to the extent of 1,900 man-years.

Emergency relief crews assist flood relief.--Over 100 relief laborers working on the phony peach disease control project in the vicinity of the flood-stricken areas were assigned to flood-relief work in the recent disaster, 24 men working 7 days in Missouri and 81 men working 8 days in Illinois.

Citrus canker recurring in Galveston area.--The reinspection of every citrus tree in the known infected area in Texas in February disclosed citrus canker on nine properties in the counties of Galveston, Brazoria, and Harris. All of these infections occurred on properties where the disease had been reported in recent months, and the 100 infected trees consisted of young seedling growth on spots where the parent trees were recently eradicated. Such seedlings are being rapidly eradicated, and a careful record is made of every remaining citrus plant in these counties.

Peach mosaic control.--Removal of abandoned and infected peach trees in the infected area in California has continued as a winter project, 10,000 infected and 47,000 abandoned peach trees having been removed from San Bernardino and Riverside Counties up to the close of February. Survey work is under way in El Paso County, Tex., and in Dona Ana County, N. Mex., for the purpose of locating peach-growing properties and discussing the situation with owners prior to starting the eradication project in these areas.

No Federal quarantine on peach mosaic.--No restrictions will be placed at this time on the interstate movement of host plants of the peach mosaic disease, known to exist in parts of Arizona, California, Colorado, New Mexico, Texas, and Utah, according to an announcement by the Secretary on January 21. In making this decision, he states that consideration was given to the fact that cooperative Federal-State inspection and eradication are under way in all infected areas and it is believed that at present the prevention of spread of the disease can be handled satisfactorily through State regulatory action. Such quarantines have been placed by Arizona, California, Oregon, and Utah. The California quarantine provides for the entry of the host plants from the infected areas when certified that no disease has been found for a year within 5 miles of the nursery or the budding wood, as determined by competent inspection prior to June 30.

Transit inspection increased in New York.--The recent assignment of additional inspectors in New York City has made possible the checking of quarantined materials in coastwise shipping from the Northeastern States, and of additional freight terminals and parcel-post points. An uncertified shipment of slag from the gypsy moth area constituted a recent important interception. Interdealer shipments in the Japanese beetle area are also being checked for compliance with quarantine requirements.

Articles checked in transit.--Transit inspectors report that shipments found in transit at this time of year, which require checking as to quarantines, consist chiefly of such articles as bulbs, greenhouse plants, increased quantities of quarry products and other building material, greatly increased quantities of citrus fruits from Texas, and wholesale movement of nursery stock from south to north. Some of the infringements consisted of movement from regulated areas of two shipments of cotton bolls, one containing a boll weevil; used empty cable reels; wooden crates with bark; pussy willow and other cuttings; baskets of sheet moss; and consignments of potted plants from a greenhouse in the newly regulated Japanese beetle area in Ohio to dime stores at a dozen points in the Midwest. At Atlanta a number of violations of State quarantines relating to phony peach disease were noted and reported to State authorities.

Boston's new parcel-post building facilitates transit inspection.--The many postal activities formerly scattered widely throughout the Boston district are now centered at the new $4,000,000 parcel-post building at the South Station, where transit inspection can be done at three different sorting points. Fifty thousand packages were handled by postal clerks on the opening day.

Japanese beetle area extended.--Federal Quarantine No. 48 and supplementary regulations were revised effective March 1, the principal change consisting in the addition to the regulated areas of the cities of Brewer, Maine; Burlington, Vt.; Buffalo and Lackawanna, N. Y.; Cleveland, Columbus, Toledo, and Canton, Ohio; Parkersburg, W. Va.; and other districts in Ohio and Maryland.

Blister rust quarantine regulations revised.--White pine blister rust control areas having recently been legally established in Maryland, Ohio, Pennsylvania, and Wisconsin, wherein the planting or possession of currant and gooseberry plants is forbidden under State authority, the Department revised the quarantine regulations relating to the disease to provide that, effective March 1, such plants may be shipped to these States only under a control-area permit obtained from the officer of the State of destination. There are now 13 States to which this provision applies. Some minor modifications relating to pine shipments were also made.

States enact satin moth quarantines.--Following the recent revocation of the Federal quarantine relating to the satin moth, the States of Oregon and California placed quarantines in February relating to the pest. While the two quarantines are somewhat lacking in uniformity, both prohibit the entry of host plants grown in the infested areas of New England and Washington, and place restrictions with reference to storage in such areas. California also prohibits entry of host plants grown in the infested part of Oregon. Oregon also restricts the intrastate movement of the host plants from the 10 infested counties in that State.

INSECTICIDE INVESTIGATIONS

New knowledge of calcium arsenate.--The investigation of calcium arsenate being conducted by this Division has been referred to before in the News Letter. An important step in this investigation has just been made. The New York Agricultural Experiment Station, working with the method of determining soluble arsenic devised by them, concluded that those brands which showed high solubility contain dicalcium arsenate. We have recently had four samples of commercial calcium arsenate examined by S. B. Hendricks, of the Bureau of Chemistry and Soils, by the methods of X-ray analysis in comparison with a sample of pure dicalcium arsenate, $CaHAsO_4.H_2O$, prepared by us. The spectrum characteristic of this compound was present in three of the samples, and the intensity was in every case in the same order as the soluble arsenic. The fourth sample represented a special attempt by the manufacturer to produce a product of very low solubility, and the dicalcium arsenate pattern was absent from the X-ray diffraction spectrum. This acid arsenate theoretically should not be present in a mixture such as commercial calcium arsenate which contains excess free lime, but it evidently is formed in the regions where the arsenic acid is temporarily in local excess during its addition to the lime, and does not have time to be destroyed by the excess lime in the period of mixing and standing adopted by the manufacturer.

Variability in lead residues on apples.--There has just appeared in the Journal of Economic Entomology (vol. 30, no. 1, pp. 174-179, February 1937) an account by M. H. Haller, C. C. Cassil, and Edwin Gould of a study of the variability in spray residue from tree to tree in a sprayed plot and from sample to sample within a tree, the chemical work on which was done in this Division. Eleven spray treatments were applied to Stayman Winesap apples. Each spray treatment was replicated three times on adjoining or closely adjacent trees. The fruit from each replication was kept separate and duplicate 30-apple samples were taken from each replication for the determination of lead residue at harvest. Additional analyses of duplicate 15-apple samples were made with certain of the lots after various washing treatments. Considerable variation was found to exist between determinations within spray treatments. Statistical examination of the data showed that variations between duplicate determinations within replicates, representing sampling and analytical errors, were relatively small and due in part to the size of the apple in the samples. Variations between replicates within spray treatments would represent differences due to the application of the sprays or to differences in the growth condition of the trees. The variation between replicates both at harvest and after washing was found to be quite large and not attributable to the size of the fruit. These variations introduce a serious error that should be taken into account in the comparison of spray treatments.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Valuable series of the chrysomelid genus Lema received.--The Division of Truck Crop and Garden Insect Investigations recently submitted for determination two series of Chrysomelidae belonging to the genus Lema, taken in Ohio by B. J. Landis. The material was accompanied by valuable contrasting ecological data based on observations by Mr. Landis. One series was taken on Physalis while the other was from jimsonweed (Datura). The species observed on the former plant was found not to feed on jimsonweed, while the other form was not common on Physalis. H. S. Barber has identified the series from Physalis as Lema trilineata Oliv. and the other as L. ?lecontei Clark, a name proposed to replace the preoccupied trivirgata Lec. Until the receipt of this material little value had been ascribed to the supposed distinctions between these and other forms of the trilineata complex. The data submitted with these specimens, however, suggest that two distinct species were involved. This type of information is always of definite assistance in clearing up taxonomic confusion and is greatly needed.

A European sawfly parasite established in the United States.--Among a quantity of parasitic Hymenoptera recently submitted for determination by A. E. Brower, of the Maine Entomological Laboratory at Bar Harbor, were three specimens which have been identified by C. F. W. Muesebeck as Phanomeris phyllotomae Mues. They had been obtained in July 1936 from larvae of the birch leaf-mining sawfly (Phyllotoma nemorata Fallen) at Bar Harbor, where a small colony of the parasite was liberated in 1933. This appears to be the first record of a recovery of this introduced braconid parasite.

New distribution record for a spruce sawfly.--Specimens of sawflies, identified by Grace Sandhouse as Pachynematus alaskensis Rohwer, were contained among material recently submitted for determination by A. E. Brower. They had been reared from larvae taken on white spruce at Readfield, Harpswell, Mount Desert Island, and Mt. Katahdin, Maine. The species was originally described from Sitka, Alaska. Subsequently specimens were received at the National Museum from Itasca Park, Minn., but those from Maine are the first to be recorded from eastern United States. Although superficially resembling P. ocreatus (Harrington), females of alaskensis may be distinguished by the shape of the saw sheath, as well as by characters of the saw itself.

Another European sawfly in the United States.--Among material recently submitted for determination by the Division of Forest Insect Investigations were specimens that have been identified by Grace Sandhouse as Neodiprion sertifer (Geoff.). They were reared from larvae taken on Pinus mughus at Somerville, N. J., in 1925, by M. T. Smulyan who was at that time engaged in investigations of gypsy moth parasites in the New Jersey infestation. That the sawfly was locally abundant is indicated by the record that several thousand larvae were collected. Since N. sertifer has been reported as occurring on other species of pine in Europe, it will be interesting to learn whether any of the American species of Pinus are attacked.

Additions to Homoptera collections.--A male and a female of a species of Chermidae recently intercepted by the Division of Foreign Plant Quarantines at Brownsville, Tex. (Nos. 13642 and 13747), have been identified by P. W. Oman as Tetragonocephala flava Crawford, a species described from a single specimen collected at Brownsville in 1904 by H. S. Barber. Crawford reported that his unique type was a male, and drew a figure of what he considered to be male forceps. However, a study of the type and the two specimens mentioned above shows the type to be a female, the male never having been described. In addition to the type and the pair of specimens from Brownsville, T. flava is represented in the National Museum collection by a female specimen from Arizona, collected by Mr. Oman in 1933. A specimen of a leafhopper, determined as Cicadella albidonotata Fowler, intercepted at San Francisco, Calif. (No. 9960), on bananas from Panama, is the first example of that species to be acquired for the National Museum collection.

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